It would be ideal if the division ratios could be configured accurately as described, then the 4 MHz oscillator could be more easily adjusted; a frequency reference would be available for other uses, and there would be the possibility of using an external 1 MHz clock. However, failing that, simple adjustment as described in the first paragraph would at least give accurate time-keeping.
Peter Vince (by email)

Te designer of the circuit, Manoel Conde de Almeida, replies: You are right. The 0.256 ms error is the admitted error considering that the crystal oscillator will run at the nominal crystal oscillation frequency (in this case 4 MHz). Of course, we all know that off the shelf crystals have a tolerance of around 100 ppm.
The idea of replacing one of the capacitors by a trimmer looks good and seems to be the most effective one. But we have to remember that it would require special equipment (a calibrated frequency meter, for instance) for the adjustment process. Some readers interested in building the clock may not have that kind of infrastructure available.
Using the firmware (mathematics) is an alternative but, since we never know the exact frequency the oscillator will be running at (assuming that the user does not have equipment to measure/adjust the frequency), it becomes more difficult to develop a 100% accurate solution.

Anyway, along that line of thought, I have worked on a firmware solution that tries to minimize the issue by giving the user the opportunity to change the maximum count of the register that keeps track of the TIMER_0 interrupts and updates the clock's seconds counter.
The user may select 1 of 3 operating modes depending on the clock's behaviour (slow, OK, fast). Each mode establishes different maximum counts for the TIMER_0 counter.
It doesn't solve the problem entirely but minimizes the error when the oscillator is running near the limits of the crystal tolerance. The solution, though, works with the PIC16F628 and not the PIC16F84A because of programming memory space. If you're interested I can share more information and exchange more ideas with you and other Elektor readers.

Self-discharging NiMH batteries Dear Jan, in a recent article on digital cameras published by a renowned computer magazine I stumbled on the following rather bold statement: "NiMH batteries suffer from energy loss at a rate of about 1% per day". I am not an electronics buff and although the statement does not come from any of your articles I would still invite your comment?
G. Lisabeth (by email)

The statement is correct. All cells lose energy owing to self-discharging and NiMH batteries are no exception. Although the exact rate of discharge depends on the cell type (i.e., technology) '1% per day' is a generally accepted value.

ECD CD-ROM Dear Editor, I recently bought a copy of your ECD CD-ROM. I have a few questions on the product:
1. Reference is made to an elusive 'booklet' explaining the installation and use of the CD-ROM. What I was able to find was a leaflet (inlay) giving just the minimum system requirements.
2. Is it possible to use the CD-ROM without having to copy the lot to hard disk? If so, how is it done? I was unable to find any guidance.
3. Eventually I did install the product on hard disk and found it a pleasure to work with. My only objection is that a subject has to be closed before another can be selected, or am I missing something? Otherwise, full marks for the ECD!
Robert Fruytier (Netherlands)

Thanks for your positive criticisms Robert, and glad to read that you like the product. As the installation is mostly self-evident, any sort of description is superfluous and would not fill a booklet anyway. There's no way you can avoid copying all data on the CD-ROM because the immense size of the component database makes it impossible to handle from CD-ROM particularly on slower PCs.
There's no need to close subjects every time. Several subjects may be opened in sequence and you may switch between them using the ALT+TAB key combination (yes the method dates back to Windows 3.1). The selection menu is also accessible by right-clicking on the icon in the status bar.

Economic forces Dear Publisher, thanks for your notice to renew my subscription to Elektor Electronics this year. Your information that you have to increase the subscription rate yet again this year due to economic reasons, I fully understand. Unfortunately, due to the strong British Pound and your increases of subscription over the last three years, the cost of your magazine is no longer affordable for myself. This is very disturbing for myself, but having been a reader and subscriber of this magazine for over 26 years, I have, with a heavy heart, decided not to continue my subscription to your wonderful magazine. The main reason is that, being a pensioned person and still active in various fields of electronics, I just cannot afford it anymore!
I wish you all the best and hope you will continue to produce a wonderful and A-1 magazine!
Sejjad Salam (Slovenia)

Sejjad, we were sorry to read your email but fully appreciate your problems and thank you for having been a subscriber for so long. Despite the recent price increases we can still claim to offer the best cost per circuit figure of all electronics magazines published in the UK.
We hope that in the future you will still be able to pick up the odd copy of Elektor from a newsstand if a subject to your liking is published (do check our website — it is free).

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